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ABSTRACT

Research on economic and employment opportunities for men and women has not focused enough on structural features of the labor market. Structural features, which influence worker's capacities to translate their human resources into labor market achievements, include profitability of industries, strength of worker organizations, skill requirements, permeability of labor market boundaries, and occupational sex segregation. A model based on shifts in occupational gender composition can help explain occupational segregation during a period of substantial industrial growth (1870-1900). Such a model can also be extended to other periods. Case histories of approximately 50 occupations (milliners, actors, musicians, journalists, teachers, scientific personnel, potters, for example) during the late 19th century illustrate the hypothesized occupational sex segregation. The model explains this segregation in terms of social definitions of occupations as women's work or men's work, differential acquisition of skills by gender, projected employment stability of males and females, and level of industrialization. On the basis of occupational sex segregation patterns from 1870-1900, it is concluded that present patterns of employment are influenced by the past, high status occupations continue to exclude women, and decreases in occupational segregation will occur only when labor market boundaries are rendered less rigid. (DB)

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CHANGES IN THE STRUCTURE OF WORK AND THE SEXUAL COMPOSITION
OF OCCUPATIONS: 1870-1900,

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INTRODUCTION

Research on sex differences in social and economic status has largely focused on women's employment patterns, particularly in terms of their occupational and economic positions relative to those of men. Most frequently, analyses of women's status parallel earlier studies of men via empirical examinations of individual level processes of attainment (Suter and Miller, 1973; Alexander and Eckland, 1974; Treiman and Terrell, 1975a; Featherman and Hauser, 1976). Despite this dominant emphasis on individual level factors, recent work increasingly recognizes the importance of structural features of the labor market (Sørensen, 1974; Stolzenberg, 1975; Spilerman, 1977), including their effects on gender differences in occupational rewards (Bibb and Form, 1977; McLaughlin, 1975). "Structural features" designate supraindividual constraints and opportunities which influence individuals' capacity to translate their human resources into labor market achievements. For example, the permeability of occupational labor market boundaries, skill requirements, profitability of industries, strength of worker organizations, etc., all constitute structural factors which plausibly affect stratification processes in general and sex differences in particular. One further structural characteristic that is typically invoked as a major source of gender differentials in rewards (e.g., Blau and Jusenius, 1976; Hodge and Hodge, 1965; Bergmann and Adelman, 1973; Zellner, 1972) is occupational sex segregation--the differential distribution of men and women across the occupational structure. Occupational gender composition is almost surely associated with other structural features of labor markets, and those relationships occupy much of our theoretical attention in this paper.

This gender differential in occupational distributions is hardly a new phenomenon. Early observers of American work patterns (Cadbury et al., 1907;

Abbott, 1910) recognized that women workers were disproportionately concentrated in lower status and lower paying jobs, and even suggested that male and female labor constituted noncompeting groups that were segregated into separate sets of occupations. More recent empirical studies indicate that aggregate levels of occupational sex segregation in the United States have been considerable and highly stable throughout the twentieth century (Gross, 1968; Oppenheimer, 1970; Treiman and Terrell, 1975b), and that occupations and industries with larger concentrations of women workers generally offer lesser financial rewards (Hodge and Hodge, 1965; Oppenheimer, 1970; Snyder and Hudis, 1976; Weiss, 1966; Cooney, 1975).

These common findings indicate that female concentration is an important correlate of women's occupational rewards. However, that conclusion should not be taken to signify agreement on the causal mechanisms that underlie the association between occupational gender composition and rewards. In our view, a large part of the ambiguity concerning the operation of such mechanisms stems from a lack of research on prior issues of the sources of occupational sex segregation. In particular, few studies investigate how occupational boundaries develop and operate to maintain the sex composition of some occupations, why others change their gender composition over time, and what structural dimensions of occupations are related to both gender composition and work rewards.

This is not to claim either that earlier studies completely ignore occupational sex segregation and changes therein, or that their findings fail to inform any aspects of this phenomenon. However, several limitations of previous analyses vitiate their utility for drawing general conclusions concerning processes of occupational change and stability that underlie sex segregation. First, the predominant focus of prior research has been the occupational structure

as a whole. Many empirical analyses of trends in occupational sex segregation (e.g., Gross, 1968; Williams, 1976) employ only a single summary measure (the index of dissimilarity). These aggregate investigations consequently neglect those locations in the occupational structure where shifts in gender composition occur. Second, even those studies that explore patterns of segregation in detailed occupations tend to base conclusions largely on a single occupation (e.g., Oppenheimer, 1970).¹ Third the issue of female-to-male changes in composition is almost entirely ignored. Even if male-to-female shifts predominate empirically (as they are likely to during periods of rising female labor force participation rates), any comprehensive approach to the sources of sex segregation must consider not only the feminization of some occupations but also why men increasingly dominate others. Fourth, many empirical treatments of sex segregation, especially those which employ multivariate analyses of gender composition and economic rewards (e.g., Hodge and Hodge, 1965; Treiman and Terrell, 1975b; Snyder and Hudis, 1976), are restricted to the period from 1940 to 1970. This circumscribed temporal focus is problematic for the development of general explanations of occupational segregation, particularly because the origins of gender-specific occupational labor markets plausibly differ from the factors which maintain them in recent times. Finally, and perhaps most important, no single theoretical perspective adequately accounts for the several dimensions of occupational sex segregation that we have identified: that is, both aggregate and occupation-specific stability and change (in both directions: increase and decrease in proportions female).²

These limitations clearly indicate a need for different theoretical perspectives on the sources of occupational sex segregation and changes therein. They also provide a strong warrant for examining alternative arguments with disaggregated analyses of detailed occupations that experience various patterns

of change and stability over time. In this paper, we develop the outlines of a framework for explaining the multiple dimensions of occupational segregation identified above. Our model is based in part on an investigation of shifts in occupational gender composition in the United States from 1870 through 1900. We focus on this series of years for two reasons. First, we extend conventional measures of sex segregation back to a period of substantial industrial growth and occupational diversification, and one not yet examined in quantitative studies. Our second and more important purpose is strategic. We have elsewhere (Snyder and Hudis, 1976) indicated that the negative relationship between occupations' proportions female and economic rewards observed in recent years is largely due to the powerful over-time stability of occupational earnings and of female concentration (in the lower paying occupations). That recent stability suggests the importance of historical analyses which investigate the origins of sex segregated occupational labor markets. Simply stated, we consider that the historical experience of occupations continues to influence current patterns of sex segregation, and therefore also informs questions concerning lesser economic rewards in heavily female occupations.³ Of course, the late nineteenth century is not necessarily an optimal setting for examining early patterns of shifts in gender composition for all occupations. However, U.S. Census information on men and women in detailed occupations was first published in 1870 and constraints our analysis to begin in that year.⁴

Although we begin with an investigation of aggregate trends in occupational sex segregation from 1870 to 1900 that parallels previous studies, this analysis is preliminary to our primary focus. We also employ the occupational series for this period to identify patterns of stability and change in all comparable detailed occupations. Our major objective in the paper is to develop a framework for explaining these patterns, but one that can also be extended to other periods.

Our theoretical perspective relies on recent arguments concerning processes of labor market segmentation (e.g., Edwards et al., 1975; Gordon, 1972; Stolzenberg, 1975; Spilerman, 1977). We trace the effects of changes in the organizations of work (broadly defined to encompass several dimensions) on the differentiation of occupational labor markets and variations in the rigidity of labor market boundaries. These relationships have implications for patterns of change and stability in the gender composition of detailed occupational categories. We employ case histories of several occupations to illustrate the hypothesized processes. While this evidence by no means constitutes a rigorous test of our arguments, it is largely consistent with them. We also suggest how overall trends in occupational sex segregation can be understood as an aggregation of these occupation-specific changes. While our approach to occupational sex segregation through analyses of labor market segmentation differs from earlier formulations (e.g., Oppenheimer, 1970; Williams, 1976), we indicate several points at which it can be synthesized with them.

THE SEXUAL STRUCTURE OF OCCUPATIONS IN THE LATE NINETEENTH CENTURY

Methodological Issues and Findings from Previous Research

Previous quantitative analyses of trends in occupational sex segregation rely on data from the U.S. Census of Population to calculate and compare indices of dissimilarity (segregation) by gender for decadal intervals. The original study in this line of inquiry (Gross, 1968) reports values for the index of dissimilarity (D) that indicate substantial and relatively invariant sex segregation from 1900 through 1960 (during this period the index ranges only from 65.7 to 69.0).⁵ However, Gross computes D for each census year based on all available occupational titles. This method ignores changes (substantial ones occurred in 1910 and 1940) in the specificity and comparability of occupations categorized by

the U.S. Bureau of the Census. It is well known that D is sensitive to the specificity, and therefore the number of categories analyzed, with greater specificity producing larger segregation values (Duncan and Duncan, 1955).

Consequently, it is not clear from Gross' findings whether actual changes that occurred are being artifactually obscured by the increasing specificity of Census occupational classifications.

Williams (1976) recomputes D for 246 comparable occupational categories over the same years in order to demonstrate that Gross' results reflect a true decline in differentiation by sex which is offset by the artifactual effects of Census classification changes. Williams observes a substantial decrease in occupational segregation from 1900 to 1960, though most of that decline occurred between 1940 and 1950. There was relatively little change in occupational gender differentiation either prior to or after that decade. These results obviously suggest that major wars are an important influence on shifts in aggregate sex segregation. While Williams' study identifies important issues in measuring occupational segregation over time, neither his nor any other analysis examines such changes prior to 1900.

Trends in Occupational Sex Segregation from 1870 to 1900

We consider analyses of occupational segregation prior to 1900 to be important insofar as they indicate whether large-scale changes other than those occasioned by international wars influence aggregate trends. The decades following the Civil War were characterized by rapid mechanization in manufacturing industries and consequent changes in the organization of production (e.g., many craft occupations were transformed into factory positions). Coupled with the expansion of scientific and technical knowledge and the initiation of mass education systems during this period, it is plausible that such changes may have substantially altered gender-specific occupational recruitment patterns.

In order to investigate that possibility, our first analysis extends measures of occupational differentiation by gender back to 1870. We compute values of D for contiguous Census years from 1870 to 1900, based on data for detailed occupations in published U.S. Census tabulations. Our calculation of D parallels the work of Gross (1968) and Williams (1976), but our procedures and samples of occupations more closely approximate those of Williams. Using information on classification changes in Edwards (1943) and the Census volumes for each year, we constructed two series of comparable occupations (these include aggregations of more detailed categories where necessary). The first series contains the maximum number of identical occupations for continuous pairs of years from 1870 to 1900. The second includes a single set of occupations that match over the entire thirty year period.⁶ We report analyses for both samples of occupations. While the first maximizes coverage, comparisons with the second eliminate mistaken inferences which might result from changes in the specificity of categories over time.

Table 1 presents values of D for the 161 detailed occupations matched over the entire 1870-1900 period, and for each pair of contiguous Census years. The

-- Table 1 about here --

values computed for these years are roughly similar to those calculated by Gross and Williams for the post-1900 period, and therefore indicate a relatively high level of occupational sex segregation during the late nineteenth century. Although the large scale changes (industrialization, educational expansion) of this period did not produce dramatic shifts in the extent of occupational differentiation by gender, these computations do indicate a slight decline (approximately ten percent) over the thirty years.⁷

This latter result provides some support for Williams' (1976:39-40) hypothesis of a secular decrease in aggregate levels of occupational sex segregation. That expectation is derived from arguments (e.g., Hawley, 1950; Davis, 1948) that social

differentiation based on achieved rather than ascribed characteristics should vary positively with the extent of division of labor. We consider the general premise underlying this expectation to be reasonable. To the extent that occupational differentiation (division of labor) produces recruitment patterns based on skills, the importance of ascriptive characteristics in hiring plausibly declines. But, despite the observed decrease in sex segregation, we question the applicability of Williams' prediction to this substantive issue. For example, insofar as skill development is sex linked (e.g., due to differential training opportunities, socialization and sex stereotyping), greater division of labor may effect little change in the gender composition of occupations. In addition, the evidence is hardly strong enough to rule out other explanations of changing aggregate levels of segregation. Put another way, we consider Williams' arguments to be too simplistic to account for period-to-period fluctuations in sex segregation, and suggest alternatives in our subsequent theoretical treatment.

Occupation-Specific Patterns of Stability and Change in Gender Composition

While there is a slight decline in occupational sex segregation between 1870 and 1900, the high values of D throughout this period indicate considerable segregation. However, such a single summary measure may mask largely compensating shifts in the gender composition of different occupations. For example, if many male-to-female changes in some occupations were offset by female-to-male changes in others, such shifts would not be reflected in values of D. As we have indicated, the increasing masculinization of some occupations has been ignored in previous studies. Moreover, even if offsetting fluctuations do not occur, many occupations may still experience sufficiently large changes to warrant our interest.⁸

In order to examine these issues, we computed the mean and standard deviation of changes in the percent female in detailed occupations for contiguous pairs of

Census years, as well as the number of occupations that changed their gender composition in either direction by at least five percent. Although this criterion is admittedly arbitrary, we treat such changes as large enough to be substantively important.⁹ These measures of sex composition change are reported in Tables 2 and 3, which are based respectively on the series of comparable occupations over the entire period and the maximum number of comparable titles for subsets of years. Both of these tables indicate that mean changes across detailed occupations

-- Tables 2 and 3 about here --

are quite small for each ten-year census interval (though there was a nontrivial increase in percent female in the 161 occupations matched for 1870-1900). However, the standard deviations of changes in female concentration are fairly large, and indicate considerable interoccupational variation in the magnitude of shifts in gender composition during each decade. Therefore, the small mean changes in percent female for each decade, as well as the general indication of aggregate stability, result from largely compensating shifts from male-to-female and female-to-male. There is also a substantial number of changes of at least five percent, and shifts toward increasing masculinization occur with some frequency. Moreover, many of these changes are quite large. Table 4 reports a complete list of detailed occupations which experienced shifts of at least five percent in gender composition between 1870 and 1900. This list is rank-ordered according to the magnitude of

-- Table 4 about here --

the fluctuations, which range from increases in percent female of up to 45 percent (box factory operatives) to decrements of 20 percent (wire makers and workers). These observations further support the conclusion that considerable occupational gender change occurred in the late nineteenth century, with women gaining and losing in their representation in various occupations.

These changes in occupational gender composition from 1870 to 1900 are clearly large and frequent enough to be substantively important. Our primary theoretical objectives in this paper center on specifying the conditions under which such compositional change occurs, and linking occupation-specific shifts to aggregate trends in sex segregation. We address these issues by focusing on the effects of technological changes on occupational skill requirements and consequent demand for and recruitment of different kinds of labor. Although changing occupational skill levels are by no means the sole influence on occupational gender composition nor the only component of our explanation, their central importance during this period is suggested by an examination of Table 4. Occupations that experienced substantial changes in composition were overwhelmingly located in either the manufacturing or craft sectors of the occupational structure, two categories that are most directly affected by mechanization and resulting alterations in skill requirements.¹⁰ Before presenting our ideas concerning these relationships among technological change, skill requirements, occupational labor markets and shifts in gender composition, we first discuss and evaluate previous theoretical approaches to occupational sex segregation.

THEORETICAL PERSPECTIVES ON OCCUPATIONAL SEX SEGREGATION

The Sex Labelling of Occupations

One specification of the process that produces and (especially) maintains sex segregated occupational structures is a "sex labelling" or social valuation argument. Sex labelling attributes both considerable occupational segregation itself and some portions of women's lower occupational rewards to a process in which jobs are socially defined (and stigmatized) as "women's work." Accordingly, male and female workers are viewed as noncompeting groups segregated into separate sets of occupations (Cadbury et al., 1907:9) and, consequently, into nonintersecting labor markets (Oppenheimer, 1970:65).

This occupational segregation initially developed as women began to enter market employment in jobs which men were abandoning for more remunerative work (Oppenheimer, 1970:137-8; Lebergott, 1964:69). Women constituted a supply of cheap labor when male labor was not available (due either to exit by choice or, occasionally, to "forced" shortages such as those during the Civil War). For example, concerning the feminization of elementary school teaching in the nineteenth century, Oppenheimer (1970:80) concludes that "it does not appear that women displaced men in teaching -- though they may have replaced them."¹¹ Despite the secular growth in female labor force participation, this sexual segregation of occupational labor markets is maintained over time through the absorption of women into occupations which are already defined (both statistically and socially) as women's work (Gross, 1968; Oppenheimer, 1970). The effects of tradition, employer preferences, alleged sex-linked skills, etc., underlie this process. Moreover, new occupations created by technological change (e.g., Key punching) quickly acquire sex stereotypes because of their skill/task similarities to existing "female" occupations (Gross, 1968).

These arguments suggest that occupational sex labelling results from the interaction of differential societal evaluations of gender roles and at least two occupation-specific dimensions that are directly related to the nature of required work. Some occupational skills are clearly defined as more readily supplied by men or women. The most often cited examples of such sex-linked skills for women are occupational requirements (e.g., sewing) that involve similarities to home production and/or the use of fine motor skills (Oppenheimer, 1970:102-3). In addition, some occupations create competing demands between women's job and family responsibilities, while others facilitate the combination of labor market and family commitments (Williams, 1976; Oppenheimer, 1970). Taken together, these factors generate occupational sex labels and define a fit between job

requirements and the characteristics of workers. Consequently, they result in fairly rigid occupational boundaries that are based on gender.

A sex labelling perspective plausibly explains aggregate stability in occupational sex segregation. And it would be difficult to deny some role of normative components in the processes underlying the differential distributions of men and women across occupations. However, in our view the sex labelling approach is open to serious challenge. It does not adequately account for the slight aggregate decline in segregation that we observe from 1870 to 1900. Nor does it explain (or even address) the increasing masculinization of some occupations. In fact, if occupational sex labels apply to "male" as well as "female" categories (which is necessary for internal theoretical consistency), then increases of men should occur in already disproportionately male occupations. If this were the case, then aggregate levels of sex segregation would rise over time (a pattern which clearly is not observed). Moreover, our data provide no support for the argument that initially heavily female occupations are more likely to increase their proportions of women workers over time than are occupations initially dominated by men. For example, consider that occupations with at least twenty-five percent women in 1870 were "heavily female" (women represented about fifteen percent of the total labor force in that year). Table 4 demonstrates that, of those occupations that were already heavily female by this criterion, one-third of them actually became increasingly dominated by men between 1870 and 1900.¹² While a sex labelling perspective may help account for compositional stability in some occupations, we conclude that it is not conceptually or empirically adequate to explain observed patterns of gender compositional change in specific occupations or aggregate fluctuations in sex segregation.

Ascription Versus Achievement

Sex labelling is not the only perspective on segregated occupational structures that posits a link between some dimension of social values and occupational recruitment patterns. As we have indicated, Williams (1976) develops an approach that addresses shifts from ascriptive to achievement based differentiation processes. Specifically, he argues that only under conditions of a limited division of labor is ascription (on the basis of sex or race) the sole means of occupational differentiation. With industrialization, technological shifts alter occupational recruitment patterns. Such changes produce a more complex division of labor, which requires hiring decisions that are more heavily based on individual differences in aptitude (see also Cottrell, 1955). Williams further indicates that, while adoption of more complex technology and rejection of ascriptive criteria are not necessarily acceptable to all members of a society, a competitive advantage accrues to those who select such a path. Therefore, Williams (1976:40) concludes that "over the long run ascription along sex lines might be reduced."

Williams' aggregate predictions also implicitly make a questionable assumption concerning skills. In order for segregation to decline as achievement replaces ascription as the basis for occupational recruitment, there must be at least a rough equivalence of skill levels by gender. It is reasonable to assume that, with the exception of occupations requiring excessive strength, women's potential for developing skills necessary for job performance equals that of men. However, the actual distribution of skills may differ substantially. Women typically have fewer opportunities (e.g., via education, on-the-job training) to develop skills that are in high demand, and socialization patterns further reinforce differential acquisition of types of skills by gender. Even if achievement characteristics were the sole criteria for hiring decisions, these differences in skill

distributions would likely produce and maintain substantial occupational segregation. Although the ascription/achievement argument could in principle be extended to gender differences in skills, Williams does not do so. In our view, that omission is significant. While there is an important relationship between gender differences in skills and in occupational distributions, the correspondence between these factors is not so close that one can simply be treated as a proxy for the other.

These limitations of the sex labelling and ascription/achievement approaches indicate that neither argument simultaneously accounts for occupation-specific changes in gender composition (in both directions) and aggregate shifts in occupational segregation. While these two perspectives fail to explain some of the patterns of change observed in our analyses, they can be partially integrated into a somewhat different framework. In the next section, we present the outlines of such an alternative approach, and illustrate it with data on detailed occupations that shifted gender composition between 1870 and 1900. We begin with recent arguments concerning the structure of occupational labor market boundaries and the processes that maintain them over time. We then focus explicitly on the effects of technological and concomitant changes on occupational labor market segmentation patterns. The interrelationships among skills, job requirements, the emergence and maintenance of occupational boundaries and changes in the gender composition of detailed occupations are of particular importance in our treatment. Finally, we indicate the implications of this analysis for aggregate trends in occupational sex segregation.

LABOR MARKET SEGMENTATION AND OCCUPATIONAL SEX SEGREGATION

Segmentation of Occupational Labor Markets: Structure and Processes

Labor market segmentation approaches were initially developed to account for the persistence of poverty and unemployment in recent years (Gordon, 1972: 43), but are also applicable to a variety of more general issues of inequality. This line of inquiry is particularly relevant to occupational sex segregation because it fundamentally provides a perspective on the structure of labor market boundaries and attempts to explain differences in the distribution of various groups to occupations and firms.¹³

Dual labor market theory (one major variant within the segmentation perspective: see Doeringer and Piore, 1971; Piore, 1970; Edwards et al., 1975) specifies a differentiation of labor markets into two generally non-overlapping sectors which display the following characteristics:

...the primary market offers jobs which possess several of the following traits: high wages, good working conditions, employment stability and job security, equity and due process in the administration of work rules, and chances for advancement. The... secondary market has jobs which, relative to those in the primary sector, are decidedly less attractive. They tend to involve low wages, poor working conditions, considerable variability in employment, harsh and often arbitrary discipline, and little opportunity for advancement (Piore, 1970:55).

According to Piore (1970), several factors account for the relationship between the separation of primary and secondary labor markets and the differential placement and behavior of workers within them. First, jobs in the primary labor market require employment stability, and certain groups of workers are excluded from this sector because they display intermittent and unstable employment behavior. Put another way, there is a correspondence between the characteristics of jobs and workers in both segments.¹⁴ Second, many individuals who actually do possess the characteristics necessary for primary employment are nevertheless confined to jobs in the secondary sector because of background

characteristics (including race and gender) which employers associate with employment instability. The use of background characteristics to assess probable future work behavior has come to be known as statistical discrimination (Phelps, 1972). Moreover, workers excluded from the primary sector on this basis may further diminish the probability of movement into it by adopting unstable employment patterns as a function of the positions into which they are recruited (Piore, 1970; see also Kohn and Schooler [1973] for relevant empirical evidence on the effects of occupation on psychological functioning). In general, this correspondence among job requirements, worker characteristics and statistical discrimination helps to account for women's overrepresentation in the secondary labor market sector. Although some treatments (e.g., Edwards et al., 1975) further speculate that historical factors have increasingly rigidified primary/secondary labor market distinctions, evidence of that rigidification and the mechanisms through which it may occur remain to be established.

Preliminary to specifying the direct applicability of a segmentation perspective to stability and (especially) change in the gender composition of occupations, we need to address the relevance of this framework to segregation along occupational lines. That is, can we reasonably infer that boundaries which define and often restrict job opportunities for men and women operate at the occupational level? There are both theoretical and empirical warrants for affirmative answers to this question. Economic theories (Doeringer and Piore, 1971; Gordon, 1972; Edwards et al., 1975) indicate that qualitatively distinct sectors within the labor market display different "behavioral rules" for the translation of individual resources (e.g., skills, training) into career advancement. In other words, skill levels assume varying degrees of salience in different labor market sectors. There should be parallel differences in skill levels required for entry into these sectors (though skills are not necessarily the only entrance

criterion). For example, Stolzenberg (1975:650) argues that "the attributes that make a person valuable to an employer as an employee in one occupation may have no bearing whatsoever on that person's value as an employee in another occupation" (emphasis added). This argument suggests that the same social organizational dimensions which differentiate labor market sectors also define opportunities for entry into and advancement in occupations. Although skills may be the predominant criterion in such processes, other factors are also important. For example, differences in unionization and the consequent power of occupational groups across categories plausibly exerts strong influences on the structure of occupational boundaries (Stolzenberg, 1975:649).

This correspondence between market sectors and occupational characteristics and processes is also supported empirically, though available evidence deals primarily with economic advancement. Stolzenberg (1975) finds that wage attainment processes differ along detailed occupational lines, and Spilerman (1977) observes substantial differences in earnings trajectories of occupational stayers and movers. This is not to claim that every detailed occupational category specified by the Census constitutes a distinct occupational labor market. Both Stolzenberg and Spilerman recognize the existence of occupational "families" (categories among which job shifts frequently occur). However, there is considerable evidence that detailed occupational boundaries constitute at least one major limitation on the structure of employment and economic opportunities.

We consequently conclude that, by establishing and maintaining criteria for membership, occupations define labor markets. However, the strength of barriers to employment is not constant across occupations. Segmentation theorists suggest that the impermeability of occupational boundaries is far greater in the primary than the secondary sector, and that such differences result from the existence of "internal labor markets" (Doeringer and Piore, 1971) in the primary sector.

These internal labor markets have relatively clearly defined job ladders and ports of entry that are typically confined to the lower rungs of such ladders (Althauser and Kalleberg, 1977). Employees in internal labor markets are insulated from competition with workers outside a given firm (particularly at higher job levels) and experience orderly movement up the job hierarchy. This protection of workers within internal markets consequently operates to ensure greater continuity of employment and to limit occupational access by others seeking entry. In contrast, occupations in the secondary sector do not generally provide workers with clearly defined job ladders and regular advancement opportunities. Consequently, there is less inducement to maintain occupational membership and greater ease of occupational entry by outsiders. Taken together, these factors generate greater turnover in secondary market occupations.

Occupational Labor Market Boundaries and Shifts in Gender Composition

These characteristics of primary versus secondary labor markets are mainly oriented toward explaining cross-sectional differences in the placement and experiences of groups of workers. However, the dual labor market framework may also be easily extended to hypotheses concerning the location of occupation-specific changes in gender composition. Primary sector occupations should be much less likely to shift their gender composition over time, for several reasons. Occupations in this segment are more likely to constitute distinct occupational labor markets because the high levels of required skill and training are not so easily transferable to other occupations. These stringent employment requirements, coupled with statistical discrimination, permit close control over occupational entry points and therefore also operate to maintain stability. Moreover, internal labor markets insulate and protect workers in the primary sector, and further reduce the probability that substantial changes in an occupation's labor force composition will occur. In summary, these characteristics of primary markets,

which are often reinforced by strong unions or professional associations, all serve to rigidify occupational boundaries. It is also the case that these stable categories are typically heavily male. However, we view that as a consequence (due to women's differential access to skill and training opportunities and statistical discrimination) rather than a defining criterion of primary sector location.

The case is fundamentally different in the secondary segment. Since skill and training requirements are substantially lower, workers form a relatively undifferentiated pool whose costs (as well as those of employers) of shifting from one occupation to another are small. Therefore, occupations in the secondary sector are unlikely to constitute distinct labor markets. The absence of job ladders, etc., further increases the permeability of occupational boundaries in the secondary segment. Consequently, there is substantial opportunity for changes in gender composition to occur. Increases and decreases in proportions female (though not in the same occupation) should both be more likely in the secondary sector. But, it is probably the case that occupations which gain in female representation typically outnumber those which lose. Net of secular increases in female labor force participation, women are overrepresented in the secondary market because of their greater probability of exclusion from primary occupations. However, it should also be noted that, while men are more likely to find primary sector jobs, numerically many of them will not manifest the characteristics necessary for primary sector employment. In any case, given the undifferentiated pool of workers, we suspect that the precise location of sizeable gains or decrements in percent female will be a function of idiosyncratic factors that affect the gender-specific labor supply available to particular secondary occupations.¹⁵

Although the foregoing hypotheses need not be modified in light of the elaboration that we now develop, our discussion has ignored changes in the sectoral location of occupations and in the rigidity of their entry and exit boundaries. In this instance, we can specify hypotheses concerning the direction as well as the location of changes in gender composition. Some occupation-specific labor markets become increasingly rigidified over time, as stronger entrance barriers are established via higher skill and training requirements, increased union power, licensing, etc. With this pattern of change, we would expect declines in female representation in the occupation. Other occupational labor market boundaries will become more permeable as a function, for example, of decreased skill and training requirements (often due to technological change), legislation, declines in union strength, etc. Our argument specifies that increases in proportions of women should be observed in such occupations.

The Impact of Industrialization on Occupational Gender Composition, 1870-1900

Our arguments suggest that the impact of industrialization and concomitant changes on patterns of sex segregation during the 1870-1900 period of immediate interest may be best understood by treating shifts in occupational labor market boundaries as crucial mediating factors. We now turn to an assessment of changes in the social organization of several occupations from 1870 to 1900 in order to examine the relationships among changes in technology, skill and training requirements, unionization and gender composition. We illustrate these relationships with material from our reading of detailed occupational histories. These examples are drawn from an accidental sample of occupations that experienced substantial changes in gender composition (from Table 4, which may be consulted during the discussion that follows) and were also well documented. Although this evidence should by no means be taken as a test of our arguments, neither have we intentionally neglected information that challenges them.

Perhaps the most important general observation that emerges from our comparative analysis of several occupations is that technological and scientific innovations in the late nineteenth century did not have uniform effects on occupational skill levels. Instead, detailed occupations variously experienced decreases or increases in skill and training requirements, depending on the particular form of change in production. However, many occupations during this period experienced what was probably the most typical change: early mechanization reduced the need for highly skilled workers with lengthy previous training and replaced craft workers with semi-skilled or unskilled factory operatives. When mechanization routinized tasks in this fashion, occupational boundaries should have become more permeable. For example, among bookbinders, hand-binding predominated throughout the 19th century. However, the book-folding machine was introduced in the mid-1850s, beginning the decline in the craft character of the occupation (Summer, 1910:211). Women had traditionally played a limited role in bookbinding, since they had been confined to the making of pamphlets and other less skilled aspects of production. Men had assumed virtually all of the craft aspects of the occupation. With the introduction of machine processing, many of the craft departments dominated by men were eliminated, and women who operated mechanical bookbinders replaced them (VanKleeck, 1910; 1913). Consequently, mechanization reduced barriers to women's employment; from 1870 to 1900 there was a substantial increase in the proportion of women bookbinders.

Quite similar shifts occurred in several other occupations that experienced transformations from craft to factory production and consequent declines in required skills. For instance, highly skilled cigarmakers traditionally were men. After successive advances in machine technology dramatically altered the nature of the work, cigarmaking was divided into the semiskilled positions of "bunchmakers" and "rollers," who worked with rudimentary machines (Abbott, 1907).

These new positions were increasingly filled by women. Consequently, an occupation that had reportedly been almost entirely male prior to 1860 (Baer, 1933) became one-third female by the turn of the century.

Changes in shoemaking ultimately followed the same path. Early shoemakers were virtually always highly skilled male craftsmen (sometimes working with female or juvenile assistants), whose preparation for the occupation required a substantial period of apprenticeship. However, as successive changes in machine technology were introduced, there were fluctuations in the recruitment patterns of men and women (see Sumner, 1910:167-72). In the 1850s heavy machinery replaced handwork, and the relatively small proportion of women and children was reportedly displaced from the occupation. However, the advent of lighter machinery in the 1860s later created a subdivision of the occupation into a variety of unskilled jobs, and women experienced a resurgence in employment.

The common pattern in these occupations indicates that women's employment in craft categories was limited by the highly skilled nature of production and its concomitant requirement of extensive apprenticeship training. Women were usually considered to be unwilling to make investments in lengthy training periods, or else as poor candidates for continued employment once they were admitted to an occupation. With the introduction of forms of machine processing that routinized the content of work, skill requirements declined, training and apprenticeship barriers to entry decreased and women gained in occupational representation.

However, this is not to claim that technological innovations which routinized the content of work and reduced required skill levels necessarily facilitated women's occupational entry. Shifting skill levels sometimes had indirect effects on women's employment by stimulating the development of unions that were partly oriented toward protecting men's positions. Changes in the printing trades brought

about by mechanization in the nineteenth century provide one of the earliest examples of the influence of unions on occupational boundaries and gender composition.

As mechanical presses and linotype machines were introduced, workers in the printing trades experienced a redefinition of their occupations from craft work to semiskilled machine tending. In response to the threat of possible replacement of skilled men by unskilled workers (especially women), the major printing union required that only workers trained in all aspects of printing could operate even simple machines. The printers' union, which increased substantially in size and influence during the latter part of the nineteenth century, ultimately was successful in discouraging unskilled workers by instituting a mandatory four year linotype apprenticeship (Abbott, 1910).¹⁶ The case of printing illustrates how the establishment of more restrictive entry requirements by unions operated to rigidify changing occupational boundaries, and to deflect an increase in female employment that would have otherwise resulted from declines in necessary skills.¹⁷

The introduction of power machinery typically routinized the organization of work into a series of tasks that necessitated relatively little skill or training, and therefore often facilitated women's entry into such occupations. However, in some categories the particular type of machinery adopted or other shifts in the organization of production increased the complexity of required skills and deterred women's employment. For example, the substitution of the power loom in silkmaking discouraged hiring of women because of the complex and delicate nature of the new equipment. Once power machinery was instituted men achieved greater levels of productivity because they could keep their looms in better working order, i.e., "tuned up" as it was then called (Matsui, 1930:188).

Women frequently had to cease weaving until the mechanical problem was corrected by a loomfixer, while men were expected to make minor repairs on the looms and resume weaving.

A parallel decline in women's representation occurred among chemical workers due to greater demand for men and their real or perceived higher levels of mechanical skills. Throughout the second half of the nineteenth century chemical making became increasingly technical as scientific advances were applied in production (Haynes, 1954:386). Necessary levels of mechanical skills increased, and workers who had a "knack for tinkering" were sought (Haynes, 1954:386). Such a description did not generally apply to the common view of women in the nineteenth century. In addition, chemical manufacturing (which had always been dangerous work) became more hazardous (Leister, 1956:238). This deterioration of safety conditions was precipitated by the rapidly growing demand for chemical products, creating experimentation with new (and often unsafe) methods of production. An added consequence of this accelerating demand was a dramatic improvement in wage rates among chemical workers (Haynes, 1954:241), which may have further reduced women's employment opportunities as a function of greater competition by men for these highly paid positions.

SOME CONCLUSIONS

These examples illustrate both the varying effects of technological changes (via differential shifts in skill and training requirements) and the impact of worker organizations on occupation-specific fluctuations in gender composition during the late nineteenth century. Increases in necessary skill and training and in union power appear to have strengthened barriers to women's occupational entry, while decreases in employment requirements facilitated permeable boundaries and women's employment. In some instances (printing), union power effectively maintained entry barriers against women despite the routinization of work content and declines in skill levels that were introduced by mechanization.

Of course, our conclusions on these issues are necessarily tentative. Strong inferences concerning the relationships between changing skill levels, training, unionization and occupational gender composition must ultimately rest on more systematic evidence--including information on comparison groups of occupations that maintained stability in gender composition. We are currently gathering such data. However, while considerable caution must be exercised, the information presented in Table 4 does tend to support conclusions similar to those based on the cases that we have examined more intensively. Occupations with increasing female representation were frequently craft categories at the beginning of the 1870-1900 period. These include, for example, potters, basket-makers, bookbinders, carpetmakers, glove makers, cigarmakers and shoemakers. All of these occupations plausibly experienced declines in skill and training requirements as a result of the kinds of technological innovations that were rapidly introduced in the latter half of the nineteenth century. In addition, the relative absence of professional and managerial occupations from this list of substantial occupational "changers" and the prominent inclusion of occupations that were then (and remain) factory operative positions suggest that primary sector categories were less likely to shift their gender compositions.

Our emphasis on the theoretical and strategic importance of types of occupational labor markets and sources of change in their boundaries for understanding shifts in gender composition need not rest solely on the sketchy findings presented here. Insofar as our empirical and case study analyses are both consistent with the various general evidence on dual labor market theory that we earlier surveyed, extensions of a labor market segmentation framework to occupational sex segregation appear warranted. Put another way, no alternative approach adequately explains the patterns observed in our analyses.

What is the role of ascription/achievement or sex labelling approaches vis-a-vis our market segmentation perspective? In our view, with substantial modifications these alternatives have a place within segmentation treatments of occupational sex segregation. Changes in technology and the division of labor do influence patterns of sex segregation. However, it must be recognized that the particular forms that such changes take have variant impacts on occupational labor market boundaries and, consequently, on the magnitude and direction of gender composition shifts. Similarly, social valuation according to gender influences objective differences between men and women in the acquisition of skills and training, as well as the calculations (perceptions) of employers that result in statistical discrimination. However, sex labelling cannot stand as the major perspective on occupational sex segregation because there are too many patterns of change that it fails to explain. And, at a more general level of inquiry, sex labelling is unnecessarily restrictive insofar as it does not suitably address occupational segregation that is based on ascriptive criteria other than gender.¹⁸

SOME IMPLICATIONS: LARGE SCALE AND LONG RUN PATTERNS OF OCCUPATIONAL SEX SEGREGATION

Instead of presenting a conventional reiteration of our analyses and arguments, we prefer to conclude by extending our treatment to account for larger scale and longer run patterns of occupational sex segregation.

Relevance to Current Occupation-Specific Gender Compositions. Our treatment emphasizes sources of fluctuations in the rigidity of occupational labor market boundaries. Over time it is plausible that more occupation-specific labor markets become rigidified as more stringent entrance barriers are established via strong unions, licensing, higher skill and training requirements, etc. Of course, these changes are not necessarily irreversible, and shifts in the opposite direction (toward more permeable boundaries) also occur in some occupations. This focus on the "life histories" of occupations should inform current patterns

of gender composition, as follows. Insofar as we can identify the periods in which various occupational labor market boundaries became highly rigid (and assuming the absence of intervening sources of derigidification), this type of analysis would "explain" the persistence through current times of a given gender composition in such occupations. In other words, the influence of history on present patterns of occupational sex segregation occurs through the differential effects of earlier changes on the structure of occupational boundaries.

Relevance to Female Concentration and Earnings. The foregoing line of argument also plausibly accounts for the well documented negative relationship between percent female and economic rewards across detailed occupations, an issue to which we have accorded only peripheral attention. Simply stated, occupations that maintain or acquire the rigid boundaries associated with primary sector location both (a) have mechanisms that tend to exclude women; and (b) also have higher earnings levels, partly as a function of those same mechanisms (e.g., higher skill and training requirements, stronger unions). Consequently, the negative relationship between female concentration and rewards is easily accounted for in theory by a segmentation perspective. However, this is not to claim either that there are yet clear operational criteria for identifying occupations' sectoral location or that dual labor market theory is at this point more than a heuristic explanatory device.

Explaining Aggregate Trends in Occupational Sex Segregation. Most studies (Oppenheimer, 1970; Williams, 1976) first attempt to explain aggregate patterns of sex segregation, and only then make inferences concerning particular occupations. Conversely, the essentials of our approach to shifts in sex segregation require a primary focus on the labor market boundaries of detailed occupations. This focus also illuminates aggregate trends in occupational segregation. We take the perspective that such trends are best understood simply as the cumulative

result of all occupation-specific shifts in gender composition. Fluctuations in the index of dissimilarity over time reflect the net impact of the number of occupational boundaries which become more rigidified (as well as the extent of that rigidification) relative to those that become increasingly permeable.

This approach explains a number of characteristics of aggregate trends in occupational sex segregation. Perhaps the most predominant feature of such trends is their stable levels under most conditions. Stability is generally observed in the index of dissimilarity because, during most periods, increasing rigidification (and declines in percent female) of some occupational labor markets is offset by increasing permeability (and female gains) in others. Even the impact of massive structural changes such as the industrialization of the late nineteenth century tends to have opposite effects in different sets of occupations. We attribute the small decline in sex segregation observed during 1870-1900 to the fact that mechanization more frequently lowered skill and training levels and barriers to women's entry than raised them. In fact, in the long run the stability of aggregate patterns may be due to the offsetting effects of the technological changes that often produce more permeable boundaries and the growing power of unions to rigidify such boundaries.

Under what conditions, if any, will substantial decreases in occupational segregation occur? We believe that such decrements occur only when exogenous sources of change almost universally operate to derigidify boundaries. For example, during World War II -- which was accompanied by mechanization of many aspects of production, declining union power in the face of government war directives and drastic shortages of male labor -- the only substantial aggregate decline in occupational sex segregation of the past century took place. It is possible that widespread and effective government efforts in affirmative action

arenas will initiate the next major shift in sex segregation. But whatever the particular forms of structural changes and the periods in which they occur, their likely impact can best be assessed through a focus on occupational labor market boundaries.

FOOTNOTES

¹Those few analyses directed at a larger number of detailed occupations (e.g., Hooks, 1947) are entirely descriptive and fail to provide explanations for the sources of occupational change.

²Of course, some explanations address more than one of these dimensions. For example, Oppenheimer's (1970) "sex labelling" framework may account for stability in gender composition in the aggregate, as well as in many detailed occupations. However, that framework is problematic in the case of rapid aggregate shifts (e.g., during World War II) and for many patterns of compositional change in detailed occupations (e.g., female-to-male fluctuations). Moreover, while Oppenheimer intensively examines the early feminization of elementary school teaching, factors apart from sex labelling are necessarily invoked in her explanation.

³See Stinchcombe (1965) for an example of the temporally persisting influence of "history." He demonstrates that the timing of technological development had important effects on current patterns of industrial organization.

⁴We also consider that comparative studies are essential to understand fully patterns of occupational sex segregation. We are pursuing such studies in other portions of our work on these issues, but space limitations preclude their presentation here.

⁵The index of dissimilarity ranges in value from zero, which indicates no segregation, to one hundred, meaning all occupations are entirely male or female. These values are interpreted as the minimum proportion of men or women who would have to change their occupations in order to produce identical occupational distributions for the two sexes.

⁶Our samples of occupations differ in size for the paired-match series and the complete thirty year series because we separately identify the maximum number of matching categories in each sample.

⁷In addition, the values of D for the paired-match and complete series are similar. While the computed measures of segregation are slightly affected by shifts in the specificity of occupational classifications during this period, there is a noticeable decline in segregation irrespective of the occupational sample.

⁸We have elsewhere (Snyder et al., 1978) indicated that, even during periods characterized as persistently high in occupational sex segregation (the United States from 1950 to 1970), substantial changes in occupation-specific gender composition still occur.

⁹The five percent figure does not differ much in magnitude from alternative measures, such as one standard deviation of the change in percent female, and is also larger than minor variations due to sampling fluctuations.

¹⁰Due to space limitations, we have not identified the comparison group of occupations that experienced relatively small changes in female concentration. However, relative to the occupations listed in Table 4, those "stable" categories disproportionately represent professions, managerial and clerical occupations.

¹¹These arguments concerning the origins of sex segregated labor markets are not necessarily derived from a sex labelling perspective, except perhaps in the broad sense that they are related to societal evaluations of women as "cheap labor."

¹² These findings, and the corresponding lack of support for the sex labelling explanation of patterns of compositional change, are not peculiar to the 1870-1900 period. Our bivariate and multivariate analyses of U.S. occupational data from 1950 through 1970 similarly indicate that larger male and female gains are both more likely to occur in already heavily female occupations (Snyder et al., 1978).

¹³ Segmentation arguments also focus heavily on processes of occupational mobility and wage attainment within market segments, but the latter issues are peripheral to the distributional questions of immediate substantive interest.

¹⁴ Economists' segmentation treatments generally deal with jobs as the units of analysis. Our arguments necessarily address occupations, which we consider to be aggregates of jobs with similar characteristics [see Temme (1975) for detailed development of this reasoning and evidence that the 1960 and 1970 U.S. Census detailed occupational classifications capture variations in job characteristics quite well]. Although we cannot argue that earlier classifications capture these variations so well (they probably do not), Temme's study supports efforts at parallel theoretical statements concerning jobs and occupations. Moreover, there are other indications, discussed below (see Stolzenberg, 1975; Spilerman, 1977), that the segmentation processes of interest to us operate along detailed occupational lines.

¹⁵ Although such idiosyncratic factors probably include some sex-linked characteristics (such as physical strength), we doubt that most secondary segment occupations have particular preferences for male or female workers. If there were strong occupation-specific preferences, then we should not observe that substantial increases in proportions of men often occur in already heavily female occupations. Put another way, if employers in these occupations sought to hire female labor,

they should easily be able to do so because women are overrepresented in the pool available for secondary segment employment.

¹⁶Data in Table 4 are presented for two separate printing occupations: "printing works operatives" and "printers, lithographers and stereotypers." The former experienced a seven percent decline in female concentration between 1870 and 1900. Although the latter increased its proportion of women by about the same amount, this gain stabilized after 1890 at a relatively small ten percent. It appears as if the admittance of women printers to this occupation between 1870 and 1890 occurred in the few jobs that lacked the substantial apprenticeship requirements (Abbott, 1910).

¹⁷There is considerable evidence from other accounts (e.g., Raybeck, 1959; Schmid, 1978) that unions were a forceful influence against women's entry into many occupations. In addition to enforcing apprenticeship requirements, unions were major supporters of protective legislation for women workers. Such legislation, which restricted the conditions under which women could be employed, frequently barred them from skilled positions and denied them the political resources that derived from union membership (Schmid, 1978).

¹⁸For example, dual labor market and sex labelling arguments could each plausibly account for the extreme unevenness of occupational distributions by gender at a given point in time. However, labor market segmentation approaches are directly applicable to differential occupational distributions by race (which are not much less extreme than those according to gender: see Treiman and Terrell, 1975b) and ethnicity (see Bonacich, 1972). Conversely, racial or ethnic occupational labels do not appear sufficiently ubiquitous to explain the large degree of segregation on these criteria.

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Table 1. Crude Measures of Dissimilarity for Matched Series of Detailed Occupations, U.S., 1870-1900.

Year	Complete Series Match ^a D	Year	Paired Match ^a D
1870	.7025 (N=161)	1870	.7015 (N=241)
		1880	.6650
1880	.6690 (N=161)	1870	.6965 (N=165)
		1880	.6650
1890	.6765 (N=161)	1890	.6690
		1880	.7245 (N=167)
1900	.6300 (N=161)	1890	.7325
		1900	.6875

^aSee text for complete information on method used to match occupations.

Table 2. Means, Standard Deviations and Numbers of Large Changes in Percent Female in Detailed Occupations, U.S., 1870-1900.^a

	Decade			
	1870-1880 (N=161)	1880-1890 (N=161)	1890-1900 (N=161)	1870-1900 (N=161)
Mean Change	.43	2.92	.93	4.29
Standard Deviation of Change	5.42	6.34	4.96	10.09
Number of Occupations with at least Five Percent Increase	18	35	17	45
Number of Occupations with at least Five Percent Decrease	13	2	7	13
Total Number of Changes of at least Five Percent	31	37	24	58

^aAll comparisons based on maximum number of comparable occupations for 1870-1900.

Table 3. Means, Standard Deviations and Numbers of Large Changes in Percent Female in Detailed Occupations, U.S., 1870-1900.

	Decade				
	1870-1880 (N=241) ^a	1870-1880 (N=165) ^b	1880-1890 (N=165) ^b	1880-1890 (N=167) ^c	1890-1900 (N=167) ^c
Mean Change	.71	.18	2.88	2.92	.87
Standard Deviation of Change	6.59	6.49	6.28	6.28	5.00
Number of Occupations with at least Five Percent Increase	32	19	35	37	17
Number of Occupations with at least Five Percent Decrease	17	14	3	2	8
Total Number of Changes of at least Five Percent	49	33	38	39	25

^aMaximum number of comparable occupations for 1870-1880.

^bMaximum number of comparable occupations for 1870-1890.

^cMaximum number of comparable occupations for 1880-1900.

Table 4. Occupations With At Least Five Percent Increase or Decrease in Female Concentration

Title of Occupation	% Female 1870	% Female 1880	% Female 1890	% Female 1900	Change in % Female 1870-1900	Total # of Workers 1870	Total # of Workers 1880	Total # of Workers 1890	Total # of Workers 1900
Milliners, Dressmakers, Tailors	74	80	81	79	5	253904	419157	685018	810780
Salt Makers	0	3	6	6	6	1721	1431	1765	1775
Straw Workers	70	64	66	77	6	2029	4229	3666	3997
Journalists	1	2	4	7	7	5286	12308	21849	30098
Janitors	8	10	13	16	7	1769	6763	21556	51226
Hat & Cap Makers	27	23	28	34	7	12625	16860	24013	22733
Broom & Brush Makers	9	8	12	15	7	5816	8479	10115	10222
Printers, Lithograph., Stereotypers	4	5	10	10	7	40424	72726	118424	155333
Teachers & Scientific Persons	66	68	71	73	7	126822	227710	347344	446797
Messengers, Errand & Office Boys	1	3	6	9	8	8717	13985	51355	71695
Officials of U.S. Government	1	3	6	9	8	47029	69681	82590	90290
Traders & Dealers - Dry Goods	2	9	5	9	8	39790	45831	42527	45840
Actors	34	38	41	43	10	2053	4812	9728	14810
Shirt, Cuff & Collar Makers	69	73	76	78	10	4080	11823	21107	39432
Sail & Awning Makers	1	4	8	11	10	2309	2950	3257	3592
Daguerrotypists & Photographers	3	5	11	13	10	7558	9990	20040	27029
Hunters, Trappers, Guides, Scouts	0	0	1	12	11	1111	1912	2534	11340
Glove Makers	52	43	57	63	11	2329	4511	6416	12276
Umbrella & Parasol Makers	48	44	57	59	11	1439	1967	3403	3242
Hotel Keepers	3	7	12	16	12	26394	32453	44076	54931
Restaurant Keepers	2	6	13	14	12	35185	13074	19283	34023
Carpet Makers	34	42	48	46	12	15669	17068	22302	19372
Crafts in Unspecified Industries	5	12	12	18	13	72958	111612	137800	387710
Boot & Shoemakers/Repairers	6	11	16	19	13	171127	194079	213544	208462
Clerks & Copyists	1	1	12	13	13	259454	419477	557358	632099
Clock & Watch Makers/Repairers	4	13	58	20	16	1779	13820	8109	24188
Candle, Soap & Tallow Makers	2	7	12	18	16	1942	2923	3450	4022
Potters	2	8	13	18	16	5060	7233	14928	16140
Gold & Silver Jewelry Workers	7	7	17	24	18	18508	28405	20263	26146
Trunk, Valise, Pocketbook Makers	4	1	13	22	19	2047	32979	6279	7051
Knitting & Hosiery Mill Operatives	54	64	70	73	19	3653	12194	29555	47120
Musicians & Music Teachers	36	42	56	57	21	16010	31107	62155	92264

Table 4 (cont.). Occupations With At Least Five Percent Increase or Decrease in Female Concentration

Title of Occupation	% Female 1870	% Female 1880	% Female 1890	% Female 1900	Change in % Female 1870-1900	Total # of Workers 1870	Total # of Workers 1880	Total # of Workers 1890	Total # of Workers 1900
Confectioners	7	13	24	30	22	8219	13692	23251	31242
Bookbinders & Finishers	30	40	48	52	22	9104	13833	23858	30286
Tobacco & Cigar Workers	10	14	25	33	23	40271	77045	111625	131464
Rope & Cordage Makers	12	13	39	40	27	2675	3514	8001	7591
Basket Makers	7	11	14	34	28	3297	5654	5225	6799
Bookkeepers & Store Accountants	1	4	17	29	28	31177	59790	159174	255526
Boarding & Lodging Housekeepers	55	65	73	83	28	12785	19058	44349	71371
Packers & Shippers	4	6	26	33	30	5461	9342	24946	59769
Others in Professional Services*	0	14	27	31	31	16845	38568	14632	29176
Mill & Factory Oper. (not spec.)*	21	34	45	52	31	45260	39785	93596	90972
Artists & Art Teachers	10	23	48	44	34	4081	9104	22496	24902
Authors & Librarians	16	28	41	57	41	979	1131	6664	10020
Box Factory Operatives	37	45	73	82	45	6080	15762	17757	21098
Paper Mill Operatives	31	31	32	26	- 5	12469	21430	27817	36329
Showmen & Show Employees	8	7	4	2	- 6	1177	2604	18055	20113
Printing Works Operatives	25	20	23	18	- 7	3738	5419	6701	6056
Sewing Machine Operators	94	77	85	87	- 7	3042	7505	7126	5772
Cotton Mill Operatives	58	54	54	49	- 9	111606	169771	173142	246391
Silk Mill Operatives	71	51	59	60	-11	3256	18071	34855	54460
Chemical Makers	28	14	28	16	-12	657	2923	3628	6740
Whitewashers	14	0	0	2	-12	2873	3316	3596	3441
Lead & Zinc Workers	14	0	4	2	-13	649	2105	4616	5335
Rubber Factory Operatives	48	32	40	34	-14	3886	6350	16162	21866
Mechanics (not spec.)	15	0	0	0	-15	16514	7858	15485	9423
Cheese Makers	22	7	4	3	-19	3534	4570	11211	19261
Wire Makers & Workers	30	3	9	10	-20	2796	7170	12319	18487

*Figures in this column do not exactly duplicate the arithmetic difference between % female in 1870 and % female in 1900 due to rounding error.

*These are highly aggregated occupational categories that could be matched over time. However, although they provide exact comparability with respect to numbers of men and women workers, they should not be viewed as substantively comparable.